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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,712	06/26/2006	Yoshikazu Kawagoe	900-555	5078

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EXAMINER	
PATEL, DEVANG R	
ART UNIT	PAPER NUMBER
1735	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/584,712	KAWAGOE ET AL.	
	Examiner	Art Unit	
	DEVANG R. PATEL	1735	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 November 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 25-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,25-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment and Arguments

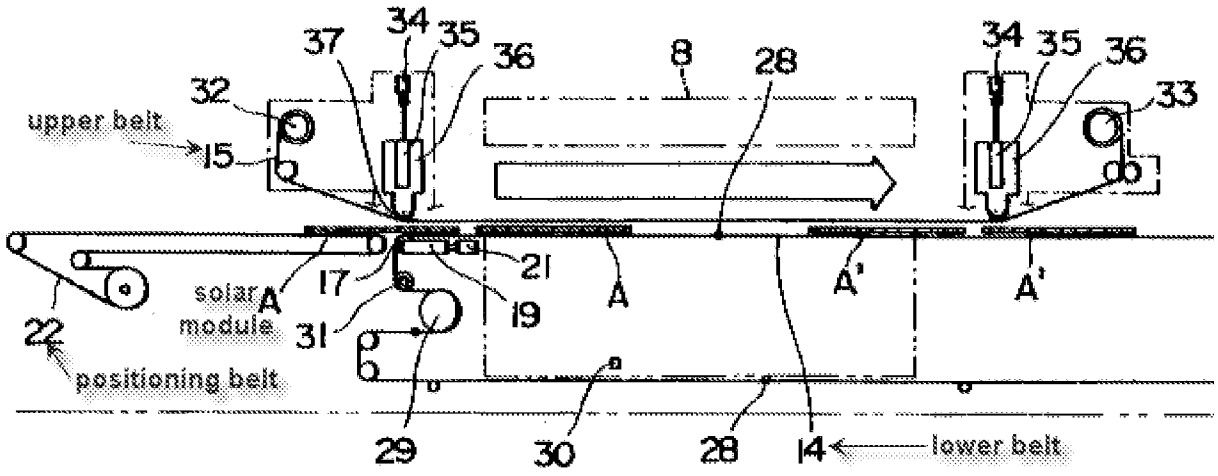
Applicant's arguments filed 11/4/10 have been fully considered but they are not persuasive.

Applicant argues that the process described in Shimotomai is not for the purpose of electrically connecting the solar cells to each other, rather, it is to laminate already interconnected solar cells for protection. Thus, Applicant argues that Shimotomai is not directed to producing the solar battery module itself.

In response, Examiner submits that while Shimotomai teaches lamination process, it still produces solar battery module as a final product and so, it meets the claimed limitation of "*a production method for a solar batter module*". Examiner also notes that the present claims do not preclude laminating, in other words, the claims are not limited to ONLY electrically interconnecting the solar cells.

With respect to claim 1, Applicant argues that in Shimotomai, the multilayer material A is never held between the upper belt 15 and the carrying-in conveyor 22, and also is never held between the upper belt 15 and the lower belt 14. Applicant further argues that Shimotomai teaches that the upper belt 15 is always lifted when material A is being lifted and so, the upper belt plays no role in holding the material A.

Examiner respectfully disagrees. Shimotomai discloses the material A (solar module) being held between the upper belt 15 and the carrying-in conveyor 22, and also being held between the upper belt 15 and the lower belt 14 as it is transported (fig. 11).



In accordance with broadest reasonable interpretation, the material A (solar module) is held between the upper belt 15 and the positioning belt 22, and also held between the upper belt 15 and the lower belt 14 while being transported as shown in fig. 11.

With respect to soldering in last step of claim 1, Applicant argues that Examiner proposes modifying Shimotomai such that rather than melting the filler, solders would be melted instead. One of ordinary skill in the art would not do this because there would be no need to replace the filler with solder since the solar cells are already interconnected.

In response, Examiner reiterates/clarifies the proposed modification of Shimotomai in view of Tonari. The combination of Shimotomai and Tonari neither replaces filler with a solder nor laminates with a solder. Shimotomai discloses interconnecting solar cells 3 with ribbon-like electrodes 4, but does not mention soldering cells 3 to electrodes 4. Tonari teaches a solar module conveyance apparatus similar to Shimotomai, wherein solar cells c are interconnected by tabs t using solder coated on surfaces of tabs t as they are conveyed through heaters (¶ 31; figs. 1, 3).

Shimotomai also discloses conveying the solar cells 3 and interconnectors 4 through heating stage during lamination. It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide solder coatings on electrodes of Shimotomai in order to effectively interconnect the solar cells as they pass through heater. It would have been obvious to an artisan of ordinary skill to perform soldering similar to Tonari in the method of Shimotomai since such is an art-recognized technique of bonding solar cells and interconnectors.

Applicant's arguments with respect to new claims 25-28 have been considered but are moot in view of the new ground(s) of rejection set forth below.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. **Claims 1-4 and 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimotomai (US 6367530) in view of Toyoma (JP 11278626 A), Meyer (US 4997507), and further in view of Tonari (JP 2000-022188 A).

a. **Regarding claim 1, Shimotomai** discloses a production method for photovoltaic modules (col. 1, lines 6-8, i.e. solar cells) comprising the steps of:

i. utilizing a production apparatus (figs. 8-12) including a carrying-in conveyor 22 (positioning belt) and a lower belt 14 in conjunction with a heating plate 11 (heating belt = lower belt + heating plate) adjacent each other in a transferable manner and an upper belt 15 (press belt) extending

over the positioning belt and the heating belt in an opposed relation to the positioning belt and the heating belt such that the press belt overlaps at least a portion of the positioning belt (fig. 10; col. 6, line 30 thru col. 7, line 14). Shimotomai discloses that the lower heating belt 14 has no suction hole.

ii. Shimotomai discloses positioning a plurality of solar battery cells (modules 3- fig. 1) and interconnectors (electrodes 4 - col. 6, lines 10-16) on an upstream portion of the positioning belt and transporting the solar battery cells and the interconnectors to a downstream portion of the positioning belt (fig. 8).

iii. Shimotomai discloses transferring the solar battery cells and the interconnectors transported to the downstream portion of the positioning belt onto the heating belt while holding the solar battery cells and the interconnectors between the positioning belt and the press belt (fig. 11).

b. Shimotomai does not disclose the positioning belt 22 having a vacuum suction hole. However, such technique is well known in the art. **Toyama** is drawn to semiconductor wafer conveyor used for solar cell, integrated circuit manufacture (Derwent- Abstract). Toyama teaches that through-holes provided on the conveying belt keep the wafer (substrate) vacuum fixed, inhibits deviation of the substrate position and thus, the transfer operation of the substrate is performed efficiently (advantage). In view of that, it would have been obvious to a person of ordinary skill in the art at the time of the invention to incorporate

vacuum holes similar to Toyama in the positioning belt of Shimotomai because doing so would prevent deviation of the solar modules during conveying and would result in smooth transition of the substrate to the heating belt (Toyama). Therefore, Shimotomai as modified by Toyama includes holding the solar cells and the interconnectors in a proper position by the action of vacuum suction holes during conveying.

c. It is unclear whether the apparatus of Shimotomai is adapted to control the heating belt and the press belt at predetermined temperatures. However, **Meyer** (drawn to apparatus for bonding laminar workpieces- abstract) discloses upper heating blocks (42, 48- fig. 1), lower heating blocks (40, 46) between a lower conveyor belt 18 and an upper conveyor belt 20 (fig. 1). Meyer teaches that such heating blocks are known to one skilled in the art and are controllable to set the temperature of their respective heating surfaces in order sufficiently heat the workpieces, cause fusion and form a sufficient bond (col. 5, lines 50-58). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to provide controllable heating blocks similar to Meyer in the apparatus of Shimotomai since such is conventional in the art. An artisan would have been motivated to provide controllable heating blocks of Meyer in the conveyor apparatus of Shimotomai in order to effectively regulate the temperature and uniformly heat the workpieces (solar modules).

d. Shimotomai discloses holding the solar battery cells and the interconnectors between the heating belt and the press belt as they are

transported. Shimotomai discloses interconnecting solar cells 3 with ribbon-like electrodes 4, but does not mention soldering cells 3 to electrodes 4. **Tonari** is directed to tab-lead soldering in manufacture of solar battery cells (¶ 1) and discloses a conveyance apparatus similar to Shimotomai. Tonari teaches soldering interconnectors t to photovoltaic cells c by solder coated on surfaces of tabs t and melting the solder using heaters 80/81/82 positioned above the conveyor belt 10 (figs. 1, 3, 6 ; ¶ 28, 31). Shimotomai also discloses conveying the solar cells 3 and interconnectors 4 through heating stage during lamination. In view of that, it would have been obvious to a person of ordinary skill in the art to provide solder coatings on electrodes of Shimotomai in order to effectively interconnect the solar cells as they pass through heater. It would have been obvious to a person of ordinary skill in the art at the time of the invention to perform soldering similar to Tonari in the method of Shimotomai since such is an art-recognized technique of bonding solar cells and interconnectors.

e. As to claim 2, Shimotomai teaches that the belt 14 is made of a glass cloth sheet immersed in a resin having a releasing function so that sticking of melting fillers is avoided (col. 6, line 66 thru col. 7, line 7). In view of that, it would have been obvious to a person of ordinary skill in the art at the time of the invention to provide the positioning belt with a resin surface because such imparts a releasing function which results in smooth transfer of the solar module during conveying from the positioning belt to the heating belt.

f. As to claim 3, Shimotomai discloses the production apparatus including a positioning belt 22 and a heating belt 14 located adjacent each other in a transferable manner (fig. 10); and a press belt 15 extending over the positioning belt and the heating belt in opposed relation to the positioning belt and the heating belt. Shimotomai discloses that the heating belt 14 has no suction hole. Shimotomai as modified by Toyama and Meyer teaches that the heating belt and press belt are each controlled at a predetermined temperature, the press belt overlaps at least a portion of the positioning belt, and the positioning belt has a vacuum suction hole.

g. As to claim 4**,** Shimotomai teaches that the belt 14 is made of a glass cloth sheet immersed in a resin having a releasing function so that sticking of melting fillers is avoided (col. 6, line 66 thru col. 7, line 7). In view of that, it would have been obvious to a person of ordinary skill in the art at the time of the invention to provide the positioning belt with a resin surface because such imparts a releasing function which results in smooth transfer of the solder module during conveying from the positioning belt to the heating belt.

h. As to claims 11-12, Shimotomai discloses a lower heating block 11 disposed on a back side of belt 14, but fails to disclose an upper heating block or cooling blocks as claimed. However, **Meyer** (drawn to apparatus for bonding laminar workpieces, fig. 1) discloses upper heating blocks (42, 48), lower heating blocks (40, 46), and cooling blocks 70 (both upper & lower). Meyer teaches that such heating/cooling blocks are known to one skilled in the art and are

controllable to set the temperature of their respective heating/cooling surfaces in order to uniformly heat/cool the workpieces, and thus form a sufficient bond (col. 5, lines 50-58; col. 6, lines 36-46). Meyer also discloses that apparatus is not limited to the configuration of the two conveyor belt assemblies (14, 16), but, if desired, it may include only one conveyor belt assembly. In such a case, the lower conveyor belt (i.e. heating belt 18) would extend from the feed station through the delivery station, including the cooling zone. Similarly, the upper belt (press belt 20) would extend through the exit of the cooling zone (col. 8, lines 58-68). Such an arrangement would include upper and lower cooling blocks as claimed. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to provide controllable heating blocks similar to Meyer in the apparatus of Shimotomai since such is conventional in the art. An artisan would have been motivated to provide controllable heating and cooling blocks of Meyer in the conveyor apparatus of Shimotomai in order to effectively regulate the temperature and uniformly heat or cool the workpieces (solar modules).

2. **Claims 5-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimotomai in view of Toyama, Meyer, and Tonari as applied to claims 1 and 3 above, and further in view of Focke et al. US 5674542, of record).

i. As to claims 5 & 7, none of the references above discloses at least one upper and lower resilient member to bias the heating belt and the press belt toward each other. However, **Focke** discloses flexible leaf springs 35 which exert

pressure on the upper conveyor belt 24 so that the upper conveyor 24 and the lower conveyor 23 are pressed together (fig. 1; claim 3). The claim would have been obvious because employing leaf springs similar to Focke in the upper and lower conveyor belts of Shimotomai would have yielded the predictable result of effectively pressing the conveyor belts together to one of ordinary skill in the art at the time of the invention. A person of ordinary skill in the art would have been motivated to incorporate such leaf springs in the conveyor apparatus of Shimotomai in order to provide effective heating by pressing the belts while conveying the solar cells.

j. As to claims 6 and 8, the apparatus of Shimotomai as modified by Focke discloses at least one upper and lower leaf spring as explained in claim 5 above.

k. As to claims 9-10, the claims would have been obvious to an artisan at the time of the invention since providing a number of resilient members as claimed is merely a provision of adjustability, which involves only routine skill in the art (MPEP 2144.04). One would provide suitable upper and lower resilient members depending the desired pressing of the belts toward each other.

3. **Claims 25-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimotomai in view of Toyama, Meyer, and Tonari as applied to claims 1 and 3 above, and further in view of Garbini et al. (US 3883386, "Garbini").

l. As to claims 25-26, none of the references above discloses at least one of heating belt and the press belt being a metal belt. **Garbini** is drawn to a continuous conveyor apparatus for joining flat materials by heating under

pressure. Garbini discloses a positioning belt 4, a press belt 1 and a heating belt 3 (fig. 1) similar to Shimotomai. Garbini teaches continuous metal belts, steel belts are preferred for their mechanical resistance and further teaches that the conveyor metal belts are lined with an antiadhesive material such as fiber glass or Teflon (col. 2, lines 27-59; col. 3, lines 53-56). The steel belts lined with antiadhesive material in Garbini are analogous to antiadhesive glass-resin belts of Shimotomai. Garbini also discloses that continuous metal belts having low electrical resistance obtain a very fast and uniform heating of the whole belt (col. 1, lines 56-67). It would have been obvious to a person of ordinary skill in the art to modify at least the heating belt of Shimotomai so as to provide metal belts similar to Garbini because it would provide good mechanical resistance, fast & uniform heating and avoid sticking/adhesion between the solar module and the belts (Garbini). Moreover, the claim would have been obvious because the substitution of one known element (conveyor belt) for another would have yielded predictable results to one of ordinary skill in the art.

4. **Claims 27-28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimotomai in view of Toyama, Meyer, and Tonari as applied to claim 1 above, and further in view of Kataoka et al. (JP-11-254526 A, "Kataoka")

m. As to claims 27-28, Shimotomai discloses pressing the solar battery cell A by the press belt 15 (fig. 2) and also discloses transferring the solar battery cell from the positioning belt onto the heating belt such that one part of the solar cell is held between the heating belt 14 and the press belt 15 while another part of

the solar cell is held between the positioning belt 22 and the press belt 15 (fig. 11). Shimotomai is silent as to transferring the solar module while being pressed by the press belt. Similar to lamination apparatus of Shimotomai, **Kataoka** (directed to lamination apparatus for laminated solar battery modules) discloses positioning belt 106, upper chamber 103, and lower belt 101 surrounding lower chamber 104 (fig. 1). The upper chamber 103 of Kataoka is comparable to upper chamber 10 above press belt 15 in Shimotomai (fig. 2). Kataoka teaches continuously pressing the solar module using upper chamber while solar module is being conveyed from the positioning belt 106 onto the belt 101, the process resulting in increased mass production (fig. 1; abstract). It would have been obvious at the time of the invention to carry out transferring of the solar module as claimed in the method of Shimotomai since such technique was recognized as part of the ordinary capabilities of one skilled in the art. One of ordinary skill in the art would have been motivated to implement continuous pressing similar to Kataoka in the lamination method of Shimotomai in order to increase mass production of solar modules (Kataoka).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The rejections above rely on the references for all the teachings expressed in the text of the references and/or one of ordinary skill in the art would have reasonably understood from the texts. Only specific portions of the texts have been pointed out to emphasize certain aspects of the prior art, however, each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

Applicant is reminded to specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. 1.121; 37 C.F.R. Part 41.37; and MPEP 714.02.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEVANG PATEL whose telephone number is (571)270-3636. The examiner can normally be reached on Monday thru Thursday, 8:00 am to 5:30 pm, EST..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DEVANG R PATEL/

Examiner, Art Unit 1735

/Jessica L. Ward/

Supervisory Patent Examiner, Art Unit 1735